

YAMIN LI

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EDUCATION

Vanderbilt University

Ph.D. student in Computer Science

Advised by Prof. Catie Chang

Russell G. Hamilton Scholar, Engineering Graduate Fellowship

Nashville, TN, U.S.A

Sept 2022– Present

Shanghai Jiao Tong University

M.Sc. in Biomedical Engineering, supervised by Prof. Shanbao Tong

Advised by Prof. Shanbao Tong and Prof. Xiaoli Guo

Legend Medical Excellence Scholarship (top 2%)

Shanghai, China

Sept 2019 – Mar 2022

Xi'an Jiaotong University

B.E. in Biomedical Engineering

National Scholarship (top 0.2%), Outstanding Graduate

Xi'an, China

Sept 2015 – Jun 2019

RESEARCH EXPERIENCE

Vanderbilt University (Department of Computer Science) – Neurdy Lab

Mentor: Prof. Catie Chang

Nashville, TN, U.S.A

September 2022 – Present

Multimodal Learning in Neuroimaging

EEG-to-fMRI Translation

- Developed a generalizable deep learning approach to translate low-dimensional neural time series (raw scalp EEG) into corresponding functional MRI activity signals across the brain.
- Designed a novel Transformer-based architecture that learns multi-dimensional, multi-scale spectral representations to effectively map EEG to fMRI.
- The developed model supports any configuration of EEG electrodes as input and allows variable time lengths, ensuring versatility and adaptability.
- Achieved state-of-the-art prediction performance across subject-dependent and unseen-subject predictions, as well as zero-shot, whole-scan predictions on data collected from a different site with different EEG and fMRI systems.

Brain Decoding – Decoding Natural Images from EEG

- Built spatiotemporal EEG Encoder to learn effective representation of multi-channel EEG signals.
- Implemented a self-supervised contrastive framework that utilizes pretrained CLIP to align EEG representation with the corresponding image representations.

Reconstructing Physiological Signals from fMRI across the Adult Lifespan

- Proposed a novel framework that leverages Transformer-based architectures for reconstructing low frequency respiratory volume (RV) and heart rate (HR) fluctuations from fMRI data.
- Tested these models on a dataset of individuals aged 36-89 years old.
- Achieved state-of-the-art prediction performance (median correlations of $r \sim .698$ for RV and $r \sim .618$ for HR).

EEG-fMRI dynamic correlations

- Summarized and reviewed the existing EEG metrics that were reported to reflect the fMRI fluctuations.
- Used data-driven unsupervised clustering method to find the prominent EEG-fMRI correlation patterns.
- Explored the temporal variation and state dependence of EEG-fMRI dynamic correlations.

Efficient 4D Neural Radiance Field and Gaussian Splatting

- Proposed direction-aware representation designed to capture scene dynamics from six distinct directions, enhancing NeRF and GS's abilities to reconstruct both static and dynamic scenes.

Shanghai Jiao Tong University (Department of Biomedical Engineering)

Mentor: Prof. Shanbao Tong, Prof. Xiaoli Guo

Shanghai, China

September 2019 – March 2022

EEG Hyperscanning Study during Mother-child Interaction

- Used dual-EEG system to explore the inter-brain synchrony during mother-child cooperative interactions.
- Designed a strictly controlled protocol, collected and processed 54 dyads of time-aligned EEG data.
- Modeled directed and undirected inter-brain network to unravel the neural mechanisms underlying adult-child interaction behaviors.

Zhejiang University (Department of Biomedical Engineering & Instrument Science)

Mentor: Prof. Dan Wu

Hangzhou, China

August 2021 – October 2021

Fetal Brain Super-Resolution Reconstruction

- Applied model-based deep-learning approach to reconstruct fetal brain MRI images with super-resolution.
- Compared different learning-based super-resolution reconstruction algorithms in fetal imaging.
- Improved reconstruction image quality from conventional optimization by 5dB in PSNR.

Xi'an Jiaotong University (Department of Biomedical Engineering)

Xi'an, China

Mentor: Prof. Gang Wang

October 2018 – January 2020

EEG Microstate Analysis During Anesthesia

- Calculated and identified specific EEG microstates during anesthesia using modified K-means, and modeled microstate-wise connectivity to predict the states of loss of consciousness.
- Developed novel and effective microstate spectral analytical methodology by embedding Hilbert-Huang transform into microstate analysis.
- Generated markers effectively estimated the brain states and outperformed other conventional EEG-based parameters by 5% in accuracy and 10% in sensitivity in SVM.

Pohang University of Science and Technology (Department of Creative IT Engineering)

Pohang, South Korea

Open-Lab Summer Internship, Mentor: Prof. Chulhong Kim

July 2018 – August 2018

Photoacoustic imaging

- Applied ring transducer to Microelectromechanical systems (MEMS) based scanning optical resolution photoacoustic microscopy (OR-PAM) system to achieve high imaging speed and high SNR.
- Conducted examinations and image acquisition through the above system and improved the image quality through post-processing.

PUBLICATIONS

Journal Articles

- J1. Lou A, Planche B, Gao Z, Li Y et al., “DaRePlane: Direction-aware Representation for Dynamic Scene”, 2024, Submitted to *IEEE Transactions on Pattern Analysis and Machine Intelligence* (IF=20.8).
- J2. Xu J, Li Y, Su R, Wu S, Wu C, Wang H, Zhu Q, Fang Y, Jiang F, Tong S, Zhang Y, Guo X, “Dynamic inter-brain states during mother-child cooperation and their neural oscillational substrates”, 2024, under review for *IEEE Journal of Biomedical and Health Informatics* (IF=7.7).
- J3. Li Y, Wu S, Xu J, Wang H, Zhu Q, Shi W, Fang Y, Jiang F, Tong S, Zhang Y, Guo X, “Interbrain substrates of role switching during mother-child interaction”, 2024, *Human Brain Mapping* (IF=5.4).
- J4. Shi W, Sun J, Sun C, Li Y, Xu H, Xu X, Zheng T, Zhang Y, Wang G, Wu D, “AFFIRM: Affinity Fusion-based Framework for Iteratively Random Motion correction of multi-slice fetal brain MRI”, *IEEE Transactions on Medical Imaging*, 2023, 42(1): 209-219. (IF=10.6).
- J5. Zhang K, Shi W, Wang C, Li Y, Liu Z, Liu T, Li J, Yan X, Wang Q, Cao Z, Wang G, “Reliability of EEG microstate analysis at different electrode densities during propofol-induced transitions of brain states”, *NeuroImage*, 2021, 231:117861. (IF=7.4).
- J6. Shi W, Yan G, Li Y, Li H, Liu T, Sun C, Wang G, Zhang Y, Zou Y, Wu D, “Fetal brain age estimation and anomaly detection using attention-based deep ensembles with uncertainty”, *NeuroImage*, 2020, 223:117316. (IF=7.4).
- J7. Li Y, Shi W, Liu Z, Li J, Wang Q, Yan X, Cao Z, Wang G, “Effective brain state estimation during propofol-induced sedation using advanced EEG microstate spectral analysis”, *IEEE Journal of Biomedical and Health Informatics*, 2020, 25(4): 978-987. (IF=7.7).
- J8. Shi W, Li Y, Liu Z, Li J, Wang Q, Yan X, Wang G, “Non-Canonical Microstate Becomes Salient in High Density EEG During Propofol-Induced Altered States of Consciousness”, *International Journal of Neural Systems*, 2020, 30(2):2050005. (IF=6.6).

Peer Reviewed Conference Proceedings

- C1. Li Y, Lou A, Xu Z et al., “NeuroBOLT: Resting-state EEG-to-fMRI Synthesis with Multi-dimensional Feature Mapping”, Accepted by the *Conference on Neural Information Processing Systems (NeurIPS)* 2024.
- C2. Harding J. M, Pourmotabbed H, Li Y et al., “Joint-Source Decomposition Analysis of Resting-State fMRI and EEG in Epilepsy and Control Subjects”, *IEEE International Symposium on Biomedical Imaging (ISBI)* 2025, (under review).
- C3. Zhang Y, Davalos E, Lou A, Li Y et al., “Weakly-Supervised Mamba-Based Mastoidectomy Shape Prediction for Cochlear Implant Surgery Using 3D T-Distribution Loss”, *IEEE International Symposium on Biomedical Imaging (ISBI)* 2025, (under review).
- C4. Lou A, Planche B, Gao Z, Li Y et al., “DaReNeRF: Direction-aware Representation for Dynamic Scenes”, *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)* 2024.
- C5. Wang S, Xu Z, Li Y et al., “Reconstructing physiological signals from fMRI across the adult lifespan”, Accepted by *Medical Imaging 2025: Image Processing, SPIE*, (Oral).

- C6. Lou A, **Li Y** et al., “Zero-Shot Surgical Tool Segmentation in Monocular Video Using Segment Anything Model 2”, Accepted by *Medical Imaging 2025: Image Processing*, **SPIE**
- C7. Lou A, **Li Y** et al., “Surgical Depth Anything: Depth Estimation for Surgical Scenes using Foundation Models”, Accepted by *Medical Imaging 2025: Image-Guided Procedures, Robotic Interventions, and Modeling*, **SPIE**, (Oral).
- C8. **Li Y**, Lou A, Xu Z, Wang S, Chang C, “Leveraging sinusoidal representation networks to predict fMRI signals from EEG”, *Medical Imaging 2024: Image Processing (Vol. 12926, pp. 795-800)*. **SPIE**.
- C9. Lou A, **Li Y**, Yao X, Zhang Y, Noble J, “SAMNeRF: Segment Anything Model (SAM) Guides Dynamic Surgical Scene Reconstruction by Neural Radiance Field (NeRF)”, *Medical Imaging 2024: Image-Guided Procedures, Robotic Interventions, and Modeling (Vol. 12928, pp. 19-23)*. **SPIE**.
- C10. **Li Y**, Wu S, Shi W, Tong S, Zhang Y, Guo X, “Enhanced inter-brain connectivity between children and adults during cooperation: a dual EEG study”, *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) 2021*: 6289-6292.

Workshops and Conference Abstracts

- A1. Li C, **Li Y**, Pourmotabbed H et al., “Vigilance-State Classification in fMRI Data with Contrastive Learning”, *Organization for Human Brain Mapping (OHBM) Annual meeting 2024*, (under review).
- A2. Rogge-Obando K, Wang S, Pourmotabbed H, **Li Y** et al., “Examining switching rates of resting state networks across arousal levels”, *Society for Neuroscience annual meeting (SfN)*, 2024, Chicago, U.S.A.
- A3. **Li Y**, Lou A, Xu Z, Wang S, Chang C, “Leveraging periodic activation functions in a deep neural network to predict fMRI signals from EEG”, *Organization for Human Brain Mapping (OHBM) Annual meeting 2024*, Seoul, South Korea.
- A4. Lee H, Sangimino M, **Li Y** et al, “Simulation-based social skills training in virtual reality (VR) reduces negative symptoms and bodily self-disturbance in schizophrenia”, *Society for Research in Psychopathology (SRP) 2023*, Saint Louis, USA.
- A5. **Li Y**, Vinet S. Q., Goodale S. E., Pourmotabbed H, Martin C. G., Morgan V. L., Englot D. J., Chang C, “Temporal variation and state dependence of EEG-fMRI correlations”, *Resting State Brain Connectivity Conference (RSBC) 2023*, Dallas, Texas, U.S.A.
- A6. **Li Y**, Vinet S. Q., Goodale S. E., Pourmotabbed H, Martin C. G., Morgan V. L., Englot D. J., Chang C, “Temporal variation and state dependence of EEG-fMRI correlations”, *Organization for Human Brain Mapping (OHBM) Annual meeting 2023*, Montreal, Canada.
- A7. Shi W, Sun J, **Li Y**, Sun C, Zheng T, Zhang Y, Wang G, Wu D, “Automated motion correction of multi-slice fetal brain MRI using a deep recursive framework”, *International Society for Magnetic Resonance in Medicine Annual Meeting 2021*, Vancouver. (Oral)
- A8. Shi W, Yan G, **Li Y**, Li H, Liu T, Zou Y, Wu D. “Fetal brain age estimation and anomaly detection using attention-based deep ensembles with uncertainty”, *International Society for Magnetic Resonance in Medicine Annual Meeting 2020*, Sydney.

TEACHING EXPERIENCE

Vanderbilt University, undergraduate & graduate course: *Foundation of Machine Learning* (CS4262/5262), Fall 2022
Prof. Catie Chang, Prof. Soheil Kolouri.

ACADEMIC SERVICE

Conference reviews: NeurIPS (2024), ICLR (2024), MICCAI (2023, 2024)

SELECTED AWARDS AND HONORS

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| • Top reviewers, NeurIPS 2024 | 2024 |
| • Best Poster Award, ECE Day, Vanderbilt University | 2024 |
| • Student Conference Travel Grant, Vanderbilt University | 2024 |
| • SPIE student travel award, SPIE Medical Imaging 2024 | 2024 |
| • Russell G. Hamilton Scholar, Vanderbilt University | 2022 |
| • Engineering Graduate Fellowship, Vanderbilt University | 2022 |
| • Outstanding Graduate (Top 6%), SJTU | 2021 |
| • Legend Medical Excellence Scholarship (Top 2%), SJTU | 2021 |
| • Graduate Academic Scholarship, SJTU | 2019 – 2021 |
| • Outstanding Graduate, XJTU | 2019 |
| • National Scholarship (Top 0.2%), Ministry of Education of the People's Republic of China | 2018 |
| • POSTECH Open-lab Scholarship, Pohang University of Science and Technology, South Korea | 2018 |
| • University-level Outstanding Student, XJTU | 2016 – 2018 |
| • Siyuan Scholarship, XJTU | 2016 – 2017 |

ADDITIONAL INFORMATION

Research Areas:

- Time-series modeling, Multi-modal learning, Brain decoding, Generative AI, Computational neuroscience, Self-supervised and supervised learning, Transformer, Biomedical time-series representation learning, Wearable sensor data modeling

Programming skills:

- Python, Pytorch, scikit-learn, Matlab, R, HTML

Language

- English (Proficient), Mandarin (Native)